

## FLOAT SWITCH OF WASHING MACHINE

### [Technical Field]

The present invention relates to float switches for sensing an amount of washing water leaked from a tub or a water supply device in a washing machine, more particularly, to a float switch in a washing machine, which can prevent infiltration of washing water to a sensor in the float switch.

### [Background Art]

In general, the washing machine washes laundry through washing, rinsing, and spinning cycles to remove soil stuck to clothes, beddings, and so on held in a drum by using action of water supplied to the tub in the washing machine, and detergent.

FIG. 1 illustrates a diagram showing an inside of a related art washing machine.

Referring to FIG. 1, the related art washing machine is provided with a casing 2, a tub 10 in the casing 2 for holding washing water, a drum 20 rotatably mounted in the tub 10 for holding the laundry, a motor 30 for supporting and rotating the drum 20, a water supply device 40 over the tub 10 for supplying washing water from an outside of the washing machine to the tub 10, and a drain device 50 for under the tub 10 for draining the washing water from the tub 10 to an outside of the washing machine.

In the meantime, there is a float switch 4 in the casing 2, for sensing washing water leaked from the water supply device, or the tub, and dropped on a bottom of the casing 2.

The float switch 4 is provided with a switch body 6, a float 7 mounted in a

switch body 6 movable in up/down direction, and a sensor 8 for sensing a position according to rise of the float 7.

The operation of the related art washing machine will be described.

Upon introducing the laundry into the drum 20, closing the door, and putting the 5 washing machine into operation, the washing water is supplied to the tub 10 through the water supply device 40, and held therein.

Then, when the motor 30 rotates the drum 20, the laundry in the drum 20 is washed by action of the washing water, and then, washing of the laundry is completed through a rinsing cycle, a spinning cycle, and a drying cycle.

10 In the meantime, during the washing cycle, the rinsing cycle, and the spinning cycle, it is liable that a portion of the washing water leaks during the washing cycle, the rinsing cycle, and the spinning cycle, and drops down onto a bottom of the casing 2. If the leaked washing water fills the bottom of the case 2 greater than a predetermined amount, the float 7 rises, such that the sensor 8 senses it.

15 However, the float switch in the related art washing machine is liable to suffer from damage and mal-operation due to infiltration of the dropped washing water between a gap in an upper surface of the switch body.

**[Disclosure]**

**[Technical Problem]**

20 An object of the present invention is to provide a float switch in a washing machine, which can prevent a sensor therein suffering from damage and mal-operation

due to infiltration of the washing water thereto.

**[Technical Solution]**

To achieve above object, in one aspect of the present invention, a float switch in a washing machine includes a switch body forming an exterior of the float switch, a float in the switch body for moving up/down by washing water, a sensor for sensing a position of the float, and a water protector for preventing the washing water from infiltrating to the sensor.

The water protector is a “ $\cap$ ” shaped bracket over an upper surface of the switch body.

Meanwhile, in another aspect of the present invention, a float switch in a washing machine includes a switch body divided into two sides, having a floating portion for rising up of leaked washing water, and a sensor space for mounting a sensor for sensing a level of the washing water in the floating portion, both formed therein, a float in the floating portion for floating on a surface of the washing water, a sensor in the sensor space for measuring a height of the float, and a water protector for preventing the washing water from infiltrating into the sensor space.

The water protector is a bracket at one of the divided two sides of the switch body over the sensor space to cover a joining surface of the divided two sides of the switch body from over the joining surface.

The bracket may have a “ $\cap$ ” shape.

The floating portion has openings in a side surface for flowing in of the washing

water.

The float switch further includes a soft member connected between one sides of the switch body divided into two sides.

The float switch further includes at least one fastening means for fastening the  
5 switch body.

The fastening means includes a hook at one of sides of the switch body divided into two sides, and a hook hole opposite to the hook for receiving and holding the hook.

At least one of the fastening means is formed over the sensor space.

In the meantime, in another aspect of the present invention, a float switch in a  
10 washing machine includes a switch body divided into two sides, having a floating portion for rising up of leaked washing water, and a sensor space for mounting a sensor for sensing a level of the washing water in the floating portion, both formed therein, a float in the floating portion for floating on a surface of the washing water, and a sensor in the sensor space for measuring a height of the float, wherein one of the two sides of  
15 the switch body includes a portion over the sensor space extended to cover a portion of the other side of the switch body over the sensor space.

The float switch further includes a soft member connected between one sides of the switch body divided into two sides.

The float switch further includes at least one fastening means for fastening the  
20 switch body.

The fastening means includes a hook at one of sides of the switch body divided

into two sides, and a hook hole opposite to the hook for receiving and holding the hook.

At least one of the fastening means is formed over the sensor space.

#### [Advantageous Effects]

The float switch of the washing machine of the present invention can prevent 5 malfunction and fault of the float switch by preventing the washing water from infiltrating into the sensor, thereby improving reliability of the washing machine.

The “ $\sim$ ” shaped bracket or the extension of the upper surface of one of sides of the switch body where the sensor space is of the water protector has a simple structure, and therefore, is easy to fabricate.

10 The fastening means at a portion where the water protector is enables firm fastening of the water protector to the upper surface of the portion of the switch body where the sensor space is, to improve water protecting capability to prevent infiltration of leaked washing water.

#### [Description of Drawings]

15 The accompanying drawings, which are included to provide a further understanding of the invention, illustrate embodiment(s) of the invention and together with the description serve to explain the principle of the invention. In the drawings;

FIG. 1 illustrates a diagram showing an inside of a related art washing machine;

FIG. 2 illustrates a diagram showing an inside of a washing machine in 20 accordance with a preferred embodiment of the present invention having a float switch of a washing machine in accordance with a preferred embodiment of the present

invention applied thereto;

FIG. 3 illustrates an exploded perspective view of the float switch in FIG. 2;

FIG. 4 illustrates a perspective view of an assembly of the float switch in FIG. 3;

and

5 FIG. 5 illustrates a perspective view of a float switch in a washing machine in accordance with another preferred embodiment of the present invention.

**[Best Model]**

Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings.

10 Wherever possible, the same reference numbers will be used throughout the drawings to refer to the same or like parts.

FIG. 2 illustrates a diagram showing an inside of a washing machine in accordance with a preferred embodiment of the present invention having a float switch of a washing machine in accordance with a preferred embodiment of the present 15 invention applied thereto, FIG. 3 illustrates an exploded perspective view of the float switch in FIG. 2, and FIG. 4 illustrates a perspective view of an assembly of the float switch in FIG. 3

Referring to FIG. 2, the washing machine includes a casing 52, a tub 60 in the tub 60 for holding washing water, a drum 70 rotatably mounted in the casing 52 for holding laundry, a motor 80 for rotating the drum 70, a water supply device 90 over the tub 60 for supplying washing water from an outside of the washing machine to the tub

60, a drain device 92 under the tub 60 for draining the washing water from an inside to an outside of the washing machine, a float switch 100 on a bottom of the casing 52 for sensing leakage of the sensing water, and a controller (not shown) for controlling the washing machine by the user or according to information on water leakage sensed.

5        The casing 52 includes side panels (not shown) forming opposite sides thereof, a back panel 56 forming a rear thereof, a base 54 forming a bottom thereof, a front cover 58 forming a front thereof having a hole 58a for introducing laundry, and a top cover forming a top thereof.

Moreover, there is a float switch 100 on the base 54 forming the bottom of the  
10      casing 52 of the washing machine, for sensing leaked washing water.

Referring to FIG. 3, the float switch 100 includes a switch body 102 forming an exterior thereof, a float 108 in the switch body 102, for moving up/down according to the leaked washing water, and a sensor 110 for sensing a position of the float 108.

The switch body 102 has a water protector 120 for protecting the sensor 110  
15      against infiltration of dropped washing water.

It is preferable that the switch body 102 is divided in left 103/right 104 sides for convenience of assembly.

Moreover, it is preferable that one sides of the left 103/right 104 sides of the divided switch body 102 are connected to each other with a soft member 105.

20        That is, the soft member 105 having ends respectively connected to the left 103/right 104 sides of the divided switch body 102 enables the switch body 102 to fold,

or open divided in left/right sides as the soft member 105 is bent.

It is the most preferable that the soft member 105 is formed of a material the same with a material of the switch body 102. However, the material of the soft member 105 is not limited thereto, but the soft member 105 may be formed of other materials, 5 such as silicone.

Inside of the switch body 102, there are a floating portion 107 for rising up of the leaked washing water, and a sensor space 109 for mounting a sensor for sensing a level of the washing water in the floating portion 105.

The floating portion 105 has openings 106 in a side for introduction of the 10 leaked washing water into the floating portion 107 in communication with an outside of the switch body 102.

In the floating portion 107, there is a float mounted thereon. It is preferable that the float 108 is formed of a material, such as Styrofoam, for floating on a surface of the washing water introduced into the floating portion 107, with a circumferential surface 15 formed smaller than the floating portion 107, and an upward projection 108a from an upper surface thereof.

It is preferable that the sensor space 109 is formed over the floating portion 107.

In the sensor space 109, there is a sensor 110 for sensing a position of the projection 108a on the float 108, and transmitting a signal the sensor 110 sensed to a 20 controller (not shown), thereby enabling to measure a level of the leaked washing water.

The switch body 102 has the water protector 120 for preventing the washing

water dropping from the drum 70 from infiltrating into the sensor space 109.

That is, the water protector 120 prevents the washing water from infiltrating into the sensor space 109 through a gap between the left/right sides 103/104 of the switch body.

5 Since the washing water drops onto an upper surface of a portion of the switch body 102 where the sensor space 109 is, it is preferable that the water protector 120 is provided over the portion of the switch body 102 where the sensor space 109 is.

It is preferable that the water protector 120 is a “ $\text{L}$ ” shaped bracket 122 at one side of the upper surface of the portion of the switch body 102 divided into two parts 10 where the sensor space 109 is.

That is, referring to FIG. 4, the “ $\text{L}$ ” shaped bracket 122 has a vertical surface attached to a side surface of one side of the switch body 104, and a horizontal surface covering an upper surface of a portion of the other side of the switch body 103 where the sensor space is 109, such that the bracket 122 extends to overlap with the sensor 15 space 109 for a predetermined distance.

Therefore, the covering of the upper surface, the joining portion of the left/right sides 103/104, of the switch body where the sensor space 109 is with the horizontal surface of the “ $\text{L}$ ” shaped bracket 122 enables to prevent the washing water from infiltrating into the sensor space 109.

20 Moreover, the float switch 100 includes fastening means for fastening the divided sides of the switch body 102 of the float switch 100.

It is preferable that the fastening means includes hooks 104a and 122a at one of the sides 103, and 104 of the switch body, and hook holes 103a, and 103b opposite to the hooks 104a and 122a for receiving, and holding the hooks 104a and 122a, respectively.

5 It is preferable that at least one of the fastening means of the hooks 104a and 122a, and the hook holes 103a, and 103b is formed on the switch body 102, and it is more preferable that a first hook 104a and a first hook hole 103a are formed opposite to a portion of the switch body 102 connected with the soft member 105, and a second hook 122a, and a second hook hole 103b are formed on the upper surface of a portion 10 where the water protector 120 is.

The second hook 122a and the second hook hole 103b formed at a portion where the water protector 120 is enables firm joining of the "L" shaped bracket 122 with the upper surface of the portion of the switch body 102 where the sensor space 109 is, thereby improving water protecting capability.

15 That is, since the vertical surface of the "L" shaped bracket 122 is attached to the side surface of the one side 104 of the switch body, the "L" shaped bracket 122 can be joined with the switch body 102 more firmly, and since the "L" shaped bracket 122 presses the one side 104 of the switch body from a side, the portion of the switch body 102 where the sensor space 109 is can be joined more firmly.

20 FIG. 5 illustrates a perspective view of a float switch in a washing machine in accordance with another preferred embodiment of the present invention, wherein a water

protector is an extension of an upper surface 220 of a portion of one side 202 of the divided switch body where the sensor space 209 is to cover an upper surface of a portion of the other side 203 of the switch body where the sensor space 209 is.

Accordingly, as an extended portion 220 of the upper surface of the portion 5 where the one side of the sensor space 209 is covers the joining portion at the upper portion of the two sides of the switch body 202, infiltration of washing water into the sensor space 209 is prevented.

Other parts of the float switch in the washing machine in accordance with another preferred embodiment of the present invention are the same with the 10 embodiment described before, the parts and operation thereof will be omitted.

The operation of the float switch in a washing machine in accordance with a preferred embodiment of the present invention will be described.

Upon applying power, and operation order, to the washing machine after introducing laundry into the washing machine, washing water is supplied to the washing 15 machine.

The washing water is supplied to the tub 60 through the water supply device 90, and then, the washing machine performs washing, rinsing, and spinning cycles according to received operation order.

In the meantime, a portion of the washing water supplied to the washing 20 machine may leak, and drop onto a base 54, the bottom of the casing 52. As a level of the dropped washing water rises, the washing water flows into the floating portion 105

through the openings 106 in the float switch 100, making the float 108 to move up.

A portion of the washing water dropped onto the upper surface of the switch body 102 where the sensor space 109 can not infiltrate into the sensor space 109, but flows down along an outside surface of the switch body 102, and, therefrom, flows into 5 the floating portion 105 owing to the “L” shaped bracket 122 of the water protector 120 over the sensor space 109 of the switch body 102.

If the leaked washing water exceeds a predetermined amount, to make the float 108 to move up more than a predetermined height, the sensor 110, sensing information on a position of the projection 108a on the float 108, transmits a signal of the sensing to 10 the controller (not shown).

Upon reception of the signal, the controller (not shown) either stops the washing machine, or indicates information on leakage of washing water, and an amount thereof to an outside of the washing machine.

Thus, the float switch of a washing machine is described with reference to the 15 attached drawings, wherein the present invention is not limited to the embodiments and the drawings, but applicable to a dishwasher, too.

Accordingly, the float switch of the washing machine of the present invention can prevent malfunction and fault of the float switch by preventing the washing water from infiltrating into the sensor.

## 20 [Industrial Applicability]

The float switch of the washing machine of the present invention can prevent

malfunction and fault of the float switch by preventing the washing water from infiltrating into the sensor, thereby improving reliability of the washing machine.

The “-” shaped bracket or the extension of the upper surface of one of sides of the switch body where the sensor space is of the water protector has a simple structure, 5 and therefore, is easy to fabricate.

The second hook and the second hook hole at a portion where the water protector is enables firm fastening of the water protector to the upper surface of the portion of the switch body where the sensor space is, to improve water protecting capability to prevent infiltration of leaked washing water.

10 Thus, the present invention has a substantially high industrial applicability.